

Richard A. Schwartz

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1. **(Currently Amended)** A method of tag-directed synthesis of a plurality of compounds, comprising:

(a) forming a first group of subsets of nucleic acid tags for participating in a first synthetic reaction step, wherein each nucleic acid ~~tags tag~~ comprises a first hybridization sequence linked to a second hybridization sequence, which said second hybridization sequence is linked to a chemical reaction site ~~and where the nucleic acid tags in each subset each has a selected one of a plurality of different first hybridization sequences, and a mixture of different second hybridization sequences,~~ by contacting said nucleic acid tags with a plurality of first immobilized nucleotide sequences, each designed to capture a subset of said nucleic acid tags by hybridization between one of said first hybridization sequences and the first immobilized sequence;

(b) carrying out the first synthetic step by reacting the chemical reaction sites in each of the subsets formed in (a) with a selected one of a plurality of first reagents, ~~thereby to convert the chemical reaction site in each of each subset of nucleic acid tag to a reagent-specific compound intermediate, on the nucleic acid tag in each subset to produce subsets of reacted nucleic acid tags;~~

(c) forming a second group of subsets of the reacted nucleic acid tags of step (b), for participation in a second synthetic reaction step, by contacting said reacted nucleic acid tags with a plurality of second immobilized nucleotide sequences, each designed to capture a subset of said reacted nucleic acid tags by hybridization between one of said second hybridization sequences and the second immobilized sequence; and

(d) carrying out the second synthetic step by reacting the reagent-specific compound intermediate of the reacted nucleic acid tag in each of the subsets formed in (c) with a selected one of a plurality of second reagents.

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